

3.3.4.6 Forested Ridge and Swale

3.3.4.6.1 Community Overview

This community complex is associated closely with Great Lakes shorelines. Series of narrow sandy ridges alternate with low swales, parallel to the lakeshore. The vegetation on the dry ridges can vary from open herbaceous or shrub communities on the semi-stabilized dunes closest to the shoreline, dry forests dominated by pines and oaks farther inland, and mixed mesophytic forests of northern hardwoods or hemlock hardwoods farthest from the shore. In a few locations, some of the ridges may support a boreal forest association that includes pines, white spruce, balsam fir, and paper birch. This may be at least partially due to the influence of the Great Lakes on local climate, creating conditions that are relatively cool and moist during the growing season. For additional details on specific upland communities associated with *forested ridge and swale* see northern dry forest (Section 3.3.5.2), northern dry-mesic forest (3.3.5.3), and northern mesic forest (3.3.5.5). Great Lakes dune (Section 3.3.4.9), while not a forest community, sometimes occupies the open beach ridges nearest the shoreline.

Water depth is a controlling factor in the swales, which are typically deeper and more open near the shoreline, supporting marsh or sedge meadow communities. Farther away from the lake, an alder-dominated shrub community may develop, and still farther inland forested wetlands of swamp hardwoods, bog conifers, or northern white cedar may be present. Only the deepest swales closest to the shore may be in contact with Great Lakes water. Most of the swales receive water via small streams or groundwater seepage from areas upslope. The wetland communities that might be part of this complex include submergent aquatic (Section 3.3.8.15), emergent aquatic (Section 3.3.8.6), interdunal wetland (Section 3.3.8.10), alder thicket (Section 3.3.8.1), northern wet forest (Section 3.3.5.6), northern wet-mesic forest (Section 3.3.5.7), and northern hardwood swamp (Section 3.3.5.4).

In Wisconsin, this community complex is best developed along Lake Michigan. The parallel ridges and swales offer exceptionally complex and diverse habitats for wetland, upland, and Great Lakes shoreline plants, and support rich assemblages of amphibians, reptiles, and breeding and migratory birds. A few ridge and swale systems occur on the Lake Superior coast.

3.3.4.6.2 Vertebrate Species of Greatest Conservation Need Associated with Forested Ridge and Swale

Eleven vertebrate Species of Greatest Conservation Need were identified as moderately or significantly associated with forested ridge and swale (Table 3-105).

Table 3-105. Vertebrate Species of Greatest Conservation Need that are (or historically were) moderately or significantly associated with forested ridge and swale communities.

<i>Species Significantly Associated with Forested Ridge and Swale</i>	
Birds	
Canada Warbler	
Herptiles	
Four-toed Salamander	
<i>Species Moderately Associated with Forested Ridge and Swale</i>	
Birds	
Solitary Sandpiper	
Black-billed Cuckoo	
Olive-sided Flycatcher	
Least Flycatcher	
Veery	
Wood Thrush	
Brown Thrasher	
Rusty Blackbird	
Mammals	
Northern Flying Squirrel	




In order to provide a framework for decision-makers to set priorities for conservation actions, the species identified in Table 3-105 were subject to further analysis. The additional analysis identified the best opportunities, by Ecological Landscape, for protection, restoration, and/or management of both forested ridge and swale and associated vertebrate Species of Greatest Conservation Need. The steps of this analysis were:

- Each species was examined relative to its probability of occurrence in each of the 16 Ecological Landscapes in Wisconsin. This information was then cross-referenced with the opportunity for protection, restoration, and/or management of forested ridge and swale in each of the Ecological Landscapes (Tables 3-106 and 3-107).
- Using the analysis described above, a species was further selected if it had both a significant association with forested ridge and swale and a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of forested ridge and swale. These species are shown in Figure 3-20.

Table 3-106. Vertebrate Species of Greatest Conservation Need that are (or historically were) *significantly* associated with forested ridge and swale communities and their association with Ecological Landscapes that support forested ridge and swale.

Forest Ridge and Swale		Birds (1)*	Herptiles (1)
Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type		Canada Warbler	Four-toed Salamander
MAJOR			
Central Lake Michigan Coastal			
Northern Lake Michigan Coastal			
PRESENT (MINOR)			
Superior Coastal Plain			

Color Key




-  = HIGH probability the species occurs in this Ecological Landscape
-  = MODERATE probability the species occurs in this Ecological Landscape
-  = LOW or NO probability the species occurs in this Ecological Landscape

* The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.

Table 3-103. Vertebrate Species of Greatest Conservation Need that are (or historically were) *moderately* associated with forested ridge and swale communities and their association with Ecological Landscapes that support forested ridge and swale.

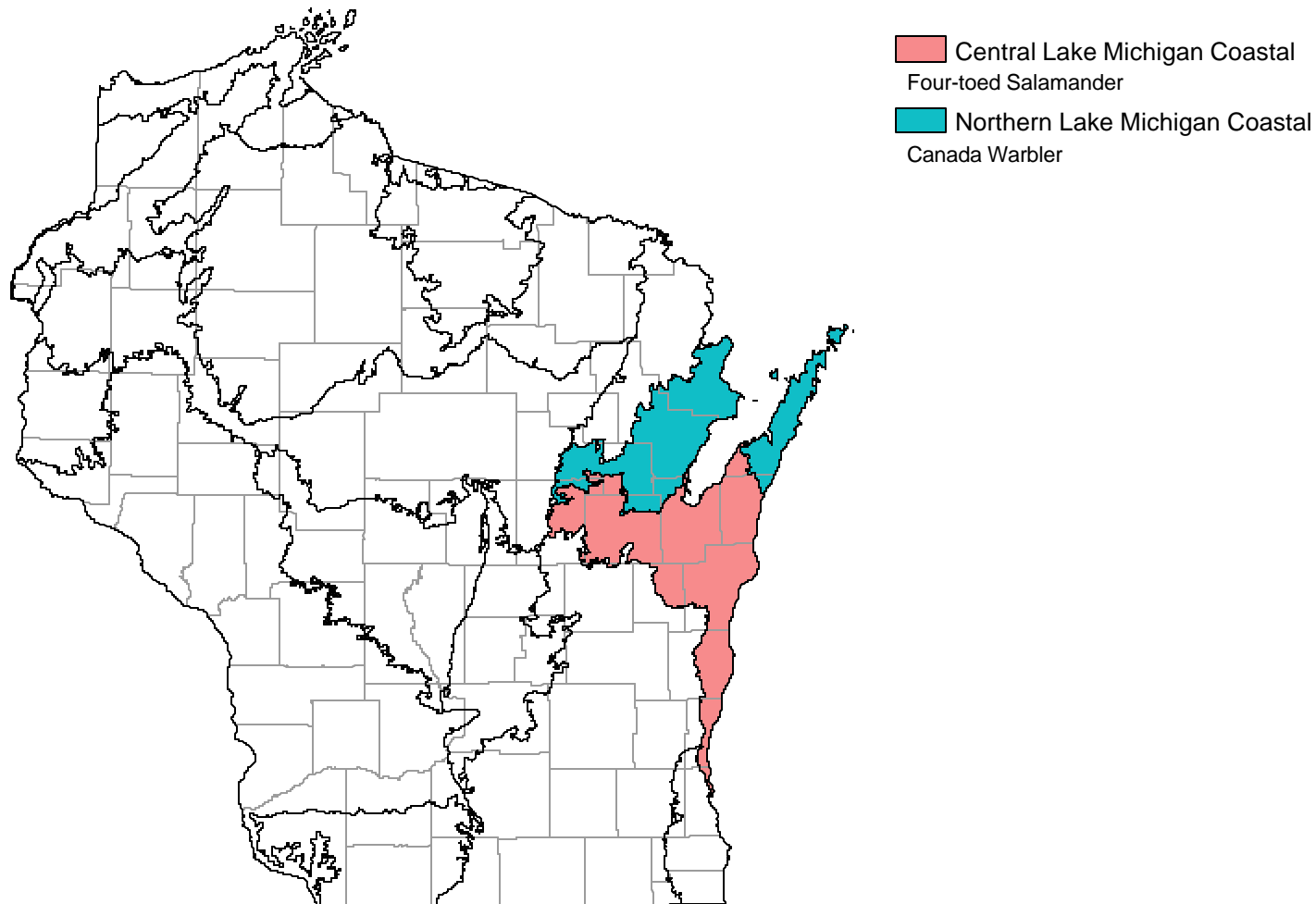
Forest Ridge and Swale	Birds (8)*								Mammals (1)
	Solitary Sandpiper	Black-billed Cuckoo	Olive-sided Flycatcher	Least Flycatcher	Veery	Wood Thrush	Brown Thrasher	Rusty Blackbird	Northern Flying Squirrel
MAJOR									
Central Lake Michigan Coastal									
Northern Lake Michigan Coastal									
PRESENT (MINOR)									
Superior Coastal Plain									

Color Key

-  = HIGH probability the species occurs in this Ecological Landscape
-  = MODERATE probability the species occurs in this Ecological Landscape
-  = LOW or NO probability the species occurs in this Ecological Landscape

* The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.

Figure 3-20. Vertebrate Species of Greatest Conservation Need that have both a significant association with forested ridge and swale and a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of forested ridge and swale.



3.3.4.6.3 Threats and Priority Conservation Actions for Forested Ridge and Swale

3.3.4.6.3.1 Statewide Overview of Threats and Priority Conservation Actions for Forested Ridge and Swale

The following list of threats and priority conservation actions were identified for forested ridge and swale in Wisconsin. The threats and priority conservation actions described below apply to all of the Ecological Landscapes in Section 3.3.4.6.3.2 unless otherwise indicated.

Threats and Issues

- Threats to site hydrology are a major concern. These can come from road construction, residential development, beaver activity, ditching, or dredging.
- The communities are all vulnerable to colonization by highly invasive plants, such as giant reed in the open wetlands, glossy buckthorn in the lowland forests, and garlic mustard and Tatarian honeysuckle in the upland forests.
- Runoff from housing developments or agricultural lands can negatively impact hydrologic patterns and water quality.
- Unsustainable logging practices can affect the abundance of some species, damage fragile soils, exacerbate the spread of invasive plants, and disrupt hydrology.
- Long-term reduction in Great Lakes water levels may disrupt community function and alter composition of the wetlands, which are dependent upon periodic inundation by lake water.
- Excessive deer browse can be a significant threat to forest communities.
- Trampling from livestock or heavy foot traffic may harm some herbaceous species.

Priority Conservation Actions

- Manage as diverse complexes that are linked by hydrology, landform, and vegetation mosaic.
- Protect intact sites, and maintain or re-establish ecological connections to other sites of high value.
- Protect site hydrology and preserve the connections to the water sources that sustain this system.
- Conduct periodic checks for invasive plants and minimize the damage caused by any problem species.
- Use management techniques that limit spread of additional invasives.
- Continue to support research designed to identify effective biological controls for invasive species.
- Monitor deer browse levels and lower deer numbers, if possible.
- If forest management takes place, apply Best Management Practices and possibly additional practices as warranted to minimize detrimental soil and water effects.
- This community type is particularly sensitive to hydrologic disruption, and placing crossings through swales to gain access to ridges can easily impede hydrologic flow with long-lasting effects. This can be true of temporary winter crossings as well as more permanent roads. Ridges in this system are formed of lake sand, and can become unstable when vegetation is removed, leading to wind erosion and slumping of roadcut banks. These “blowout” areas are not easily revegetated.
- Manage recreational uses so they are compatible with protecting these community types (e.g., limiting erosion, controlling spread of invasives, preventing damage to sensitive hydrology, soils and vegetation).

3.3.4.6.3.2 Additional Considerations for Forested Ridge and Swale by Ecological Landscape

Special considerations have been identified for those Ecological Landscapes where major or important opportunities for protection, restoration, and/or management of forested ridge and swale exist. Those considerations are described below and are in addition to the statewide threats and priority conservation actions for forested ridge and swale found in Section 3.3.4.6.3.1.

Additional Considerations for Forested Ridge and Swale in Ecological Landscapes with **Major** Opportunities for Protection, Restoration, and/or Management

Central Lake Michigan Coastal

Point Beach Ridges State Natural Area (Manitowoc County) is an exceptional example of a forested ridge and swale ecosystem. This site is partially protected by its inclusion within Point Beach State Forest and a private nature preserve. Grazing, dumping, and forest clearcutting has negatively affected parts of the larger wetland-dune complex. Another excellent example of a forested ridge and swale community occurs at Woodland Dunes State Natural Area (Manitowoc County).

Northern Lake Michigan Coastal

The Ridges Sanctuary State Natural Area (Door County) and several privately owned sites contain good examples of this community complex. The narrow ridges are forested with black spruce, white spruce, balsam fir, and eastern white pine with wet swales between the ridges. Swamp conifers occupy some of the swales; others are filled with marsh and bog flora. Sections of the forest can be classified as boreal and are similar to, but far disjunct from the northwestern Wisconsin boreal forests near Lake Superior. The cool water of Lake Michigan heavily influences the local climate, allowing many northern species to thrive.

Shivering Sands (Door County) is a large, diverse complex that occurs on the eastern side of the Door Peninsula along Lake Michigan. This site, like others on the Door Peninsula, is threatened by residential development, unsustainable logging practices, hydrologic disruption, the spread of invasive plants, and road construction. The conversion of farmland to homesites and subdivisions in the upper parts of the watershed poses potential challenges to conservation efforts directed toward maintaining the quality and quantity of surface and ground water downstream.

Additional Considerations for Forested Ridge and Swale in Ecological Landscapes with **Important** Opportunities for Protection, Restoration, and/or Management

Superior Coastal Plain

Great Lakes coastal ridge and swale systems occur near the mouth of the Bad River and in association with a coastal barrier across Chequamegon Bay.